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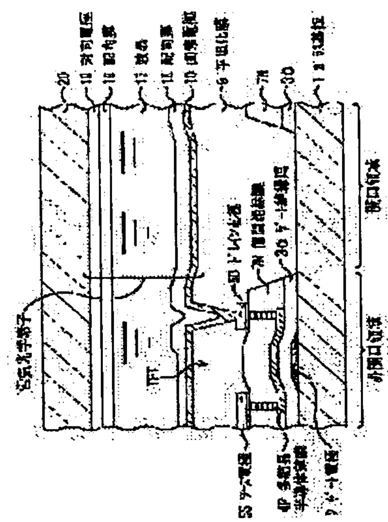
(54) DISPLAY DEVICE AND METHOD OF MANUFACTURING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent unnecessary reflection and coloring by a multilayered film present between a substrate and pixels.

SOLUTION: The display device has pixels arranged in a matrix on a transparent substrate 1. Each pixel has an opening region where an electro-optic device to emit light through the substrate 1 is formed and a non-opening region where a thin film transistor TFT to drive the electro-optic device is formed. The non-opening region has a first film structure including the thin film transistor TFT. The opening region has a second film structure extended from the first film structure and present between the electro-optic device and the substrate 1. The second film structure is varied from the first film structure so as to control the light passing through the opening region.



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2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] It has the pixel arranged in the shape of a matrix on the transparent substrate. Each pixel It has the opening field in which the electro-optics component which carries out outgoing radiation of the light through this substrate was formed, and the non-opening field in which the thin film transistor which drives this electro-optics component was formed. Said non-opening field It has the first film configuration which includes this thin film transistor. Said opening field It is the display which has the second film configuration which extends from the film configuration of this first, and intervenes between this electro-optics component and this substrate, and is characterized by said second film configuration changing from the film configuration of this first in order to adjust the light passing through this opening field.

[Claim 2] Said second film configuration is a display according to claim 1 with which at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption is characterized by the film configurations of this first differing in order to adjust the permeability or color temperature of light which contains 1 or two or more film, and passes along this opening field.

[Claim 3] Said second film configuration is a display according to claim 1 characterized by changing from the film configuration of this first so that the refractive index may approach the refractive index of this substrate compared with the film configuration of this first.

[Claim 4] It is the display according to claim 1 with which said substrate consists of glass and said second film configuration is characterized by removing the film of this silicon nitride including the film of the silicon nitride with which said first film configurations differ in glass and a refractive index.

[Claim 5] It is the display according to claim 1 which said first film configuration contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this thin film transistor and its wiring, and this thin film transistor, and is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats, as for said second film configuration.

[Claim 6] The display according to claim 5 characterized by removing this gate dielectric film or an interlayer insulation film from said second film configuration in the process which forms the contact hole to this gate electrode or this wiring.

[Claim 7] Said thin film transistor is a display according to claim 5 which has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration.

[Claim 8] Said thin film transistor is a display according to claim 5 which has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration.

[Claim 9] Said active layer is a display according to claim 5 characterized by consisting of polycrystalline silicon.

[Claim 10] It is the display according to claim 5 which said protective coat consists of transparent organic resin film, and is characterized by said second film configuration containing this organic resin film as it is.

[Claim 11] The opening field containing the electro-optics component which carries out outgoing radiation of the

light through this substrate to each pixel arranged in the shape of a matrix on a transparent substrate. In the manufacture approach of the display which forms the non-opening field containing the thin film transistor which drives this electro-optics component in said non-opening field The first membrane which includes this thin film transistor is formed. In said opening field It is the manufacture approach of the display which forms the second membrane which extends from this first membrane and intervenes between this electro-optics component and this substrate, and is characterized by said second membrane adding change to this first membrane in order to adjust the light passing through this opening field.

[Claim 12] Said second membrane is the manufacture approach of the display according to claim 11 characterized by processing at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption so that these first membranes may differ in order to adjust the permeability or color temperature of light which contains 1 or two or more film, and passes along this opening field.

[Claim 13] Said second membrane is the manufacture approach of the display according to claim 11 characterized by changing from this first membrane so that the refractive index may approach the refractive index of this substrate compared with this first membrane.

[Claim 14] For said first membrane, said substrate is the manufacture approach of the display according to claim 11 characterized by removing the film of this silicon nitride from said second membrane including the film of the silicon nitride with which glass differs from a refractive index using glass.

[Claim 15] Said first membrane is the manufacture approach of the display according to claim 11 which contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this thin film transistor and its wiring, and this thin film transistor, and is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats from said second membrane.

[Claim 16] The manufacture approach of the display according to claim 15 characterized by removing this gate dielectric film or an interlayer insulation film from said second membrane in the process which forms the contact hole to this gate electrode or this wiring.

[Claim 17] Said thin film transistor is the manufacture approach of the display according to claim 15 which has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second membrane.

[Claim 18] Said thin film transistor is the manufacture approach of the display according to claim 15 which has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second membrane.

[Claim 19] Said active layer is the manufacture approach of the display according to claim 15 characterized by using polycrystalline silicon.

[Claim 20] Said second membrane is the manufacture approach of the display according to claim 15 characterized by including this organic resin film as it is using the organic resin film with said transparent protective coat.

[Claim 21] It has the pixel arranged in the shape of a matrix on the transparent substrate. Each pixel It has the opening field in which the electro-optics component which carries out outgoing radiation of the light through this substrate was formed, and the non-opening field in which the thin film transistor which drives this electro-optics component was formed. Said electro-optics component In the liquid crystal display which, on the other hand, carries out outgoing radiation of the light which consisted of a liquid crystal ingredient held between the transparent electrodes which counter mutually, and carried out incidence from the whole surface side of this substrate to a side said non-opening field It has the first film configuration which includes this thin film transistor. Said opening field It is the liquid crystal display which has the second film configuration which extends from the film configuration of this first, and intervenes between this electro-optics component and this substrate, and is characterized by said second film configuration changing from the film configuration of this first in order to adjust the light passing through this opening field.

[Claim 22] Said second film configuration is a liquid crystal display according to claim 21 with which at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption is characterized by the film configurations of this first differing in order to adjust the permeability or color temperature of light which contains 1 or two or more film, and passes along this opening field.
[Claim 23] Said second film configuration is a display according to claim 21 characterized by changing from the film configuration of this first so that the refractive index may approach the refractive index of this substrate compared with the film configuration of this first.
[Claim 24] It is the liquid crystal display according to claim 21 with which said substrate consists of glass and said second film configuration is characterized by removing the film of this silicon nitride including the film of the silicon nitride with which said first film configurations differ in glass and a refractive index.
[Claim 25] It is the liquid crystal display according to claim 21 which said first film configuration contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this thin film transistor and its wiring, and this thin film transistor, and is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats, as for said second film configuration.
[Claim 26] The liquid crystal display according to claim 25 characterized by removing this gate dielectric film or an interlayer insulation film from said second film configuration in the process which forms the contact hole to this gate electrode or this wiring.
[Claim 27] Said thin film transistor is a liquid crystal display according to claim 25 which has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration.
[Claim 28] Said thin film transistor is a liquid crystal display according to claim 25 which has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration.
[Claim 29] Said active layer is a liquid crystal display according to claim 25 characterized by consisting of polycrystalline silicon.
[Claim 30] It is the liquid crystal display according to claim 25 which said protective coat consists of transparent organic resin film, and is characterized by said second film configuration containing this organic resin film as it is.
[Claim 31] The opening field containing the electro-optics component which carries out outgoing radiation of the light through this substrate to each pixel arranged in the shape of a matrix on a transparent substrate, The non-opening field containing the thin film transistor which drives this electro-optics component is formed. Said electro-optics component In the manufacture approach of the liquid crystal display which, on the other hand, carries out outgoing radiation of the light which held and formed liquid crystal between the transparent electrodes which counter mutually, and carried out incidence from the whole surface side of this substrate to a side in said non-opening field The first membrane which includes this thin film transistor is formed. In said opening field It is the manufacture approach of the liquid crystal display which forms the second membrane which extends from this first membrane and intervenes between this electro-optics component and this substrate, and is characterized by said second membrane adding change to this first membrane in order to adjust the light passing through this opening field.
[Claim 32] Said second membrane is the manufacture approach of the liquid crystal display according to claim 31 characterized by processing at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption so that these first membranes may differ in order to adjust the permeability or color temperature of light which contains 1 or two or more film, and passes along this opening field.
[Claim 33] Said second membrane is the manufacture approach of the liquid crystal display according to claim 31 characterized by changing from this first membrane so that the refractive index may approach the refractive index of this substrate compared with this first membrane.

[Claim 34] For said first membrane, said substrate is the manufacture approach of the liquid crystal display according to claim 31 characterized by removing the film of this silicon nitride from said second membrane including the film of the silicon nitride with which glass differs from a refractive index using glass.
[Claim 35] Said first membrane is the manufacture approach of the liquid crystal display according to claim 31 which contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this thin film transistor and its wiring, and this thin film transistor, and is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats from said second membrane.
[Claim 36] The manufacture approach of the liquid crystal display according to claim 35 characterized by removing this gate dielectric film or an interlayer insulation film from said second membrane in the process which forms the contact hole to this gate electrode or this wiring.
[Claim 37] Said thin film transistor is the manufacture approach of the liquid crystal display according to claim 35 which has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second membrane.
[Claim 38] Said thin film transistor is the manufacture approach of the liquid crystal display according to claim 35 which has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second membrane.
[Claim 39] Said active layer is the manufacture approach of the liquid crystal display according to claim 35 characterized by using polycrystalline silicon.
[Claim 40] Said second membrane is the manufacture approach of the liquid crystal display according to claim 35 characterized by including this organic resin film as it is using the organic resin film with said transparent protective coat.
[Claim 41] It has the pixel arranged in the shape of a matrix on the transparent substrate. Each pixel It has the opening field in which the electro-optics component which carries out outgoing radiation of the light through this substrate was formed, and the non-opening field in which the thin film transistor which drives this electro-optics component was formed. Said electro-optics component In the organic electroluminescence display which, on the other hand, carries out outgoing radiation of the light which consisted of an organic electroluminescence ingredient held between the electrodes which counter mutually, and was emitted itself to a side from the whole surface side of this substrate Said non-opening field has the first film configuration which includes this thin film transistor. Said opening field It is the organic electroluminescence display which has the second film configuration which extends from the film configuration of this first, and intervenes between this electro-optics component and this substrate, and is characterized by said second film configuration changing from the film configuration of this first in order to adjust the light passing through this opening field.
[Claim 42] Said second film configuration is an organic electroluminescence display according to claim 41 with which at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption is characterized by the film configurations of this first differing in order to adjust the permeability or color temperature of light which contains 1 or two or more film, and passes along this opening field.
[Claim 43] Said second film configuration is an organic electroluminescence display according to claim 41 characterized by changing from the film configuration of this first so that the refractive index may approach the refractive index of this substrate compared with the film configuration of this first.
[Claim 44] It is the organic electroluminescence display according to claim 41 with which said substrate consists of glass and said second film configuration is characterized by removing the film of this silicon nitride including the film of the silicon nitride with which said first film configurations differ in glass and a refractive index.
[Claim 45] It is the organic electroluminescence display according to claim 41 which said first film configuration contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this

thin film transistor and its wiring, and this thin film transistor, and is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats, as for said second film configuration.

[Claim 46] The organic electroluminescence display according to claim 45 characterized by removing this gate dielectric film or an interlayer insulation film from said second film configuration in the process which forms the contact hole to this gate electrode or this wiring.

[Claim 47] Said thin film transistor is an organic electroluminescence display according to claim 45 which has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration.

[Claim 48] Said thin film transistor is an organic electroluminescence display according to claim 45 which has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration.

[Claim 49] Said active layer is an organic electroluminescence display according to claim 45 characterized by consisting of polycrystalline silicon.

[Claim 50] It is the organic electroluminescence display according to claim 45 which said protective coat consists of transparent organic resin film, and is characterized by said second film configuration containing this organic resin film as it is.

[Claim 51] The opening field containing the electro-optics component which carries out outgoing radiation of the light through this substrate to each pixel arranged in the shape of a matrix on a transparent substrate, The non-opening field containing the thin film transistor which drives this electro-optics component is formed. Said electro-optics component In the manufacture approach of the organic electroluminescence display which, on the other hand, carries out outgoing radiation of the light which held and formed the organic electroluminescence ingredient between the electrodes which counter mutually, and was emitted itself to a side from the whole surface side of this substrate The first membrane which includes this thin film transistor is formed in said non-opening field. In said opening field It is the manufacture approach of the organic electroluminescence display which forms the second membrane which extends from this first membrane and intervenes between this electro-optics component and this substrate, and is characterized by said second membrane adding change to this first membrane in order to adjust the light passing through this opening field.

[Claim 52] Said second membrane is the manufacture approach of the organic electroluminescence display according to claim 51 characterized by processing at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption so that these first membranes may differ in order to adjust the permeability or color temperature of light which contains 1 or two or more film, and passes along this opening field.

[Claim 53] Said second membrane is the manufacture approach of the organic electroluminescence display according to claim 51 characterized by changing from this first membrane so that the refractive index may approach the refractive index of this substrate compared with this first membrane.

[Claim 54] For said first membrane, said substrate is the manufacture approach of the organic electroluminescence display according to claim 51 characterized by removing the film of this silicon nitride from said second membrane including the film of the silicon nitride with which glass differs from a refractive index using glass.

[Claim 55] Said first membrane is the manufacture approach of the organic electroluminescence display according to claim 51 which contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this thin film transistor and its wiring, and this thin film transistor, and is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats from said second membrane.

[Claim 56] The manufacture approach of the organic electroluminescence display according to claim 55 characterized by removing this gate dielectric film or an interlayer insulation film from said second membrane in the process which forms the contact hole to this gate electrode or this wiring.

[Claim 57] Said thin film transistor is the manufacture approach of the organic electroluminescence display according to claim 55 which has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second membrane.
[Claim 58] Said thin film transistor is the manufacture approach of the organic electroluminescence display according to claim 55 which has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second membrane.
[Claim 59] Said active layer is the manufacture approach of the organic electroluminescence display according to claim 55 characterized by using polycrystalline silicon.
[Claim 60] Said second membrane is the manufacture approach of the organic electroluminescence display according to claim 55 characterized by including this organic resin film as it is using the organic resin film with said transparent protective coat.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a display and its manufacture approaches, such as a liquid crystal display and an organic electroluminescence display. It has in more detail the pixel arranged in the shape of a matrix on the transparent substrate, and each pixel is related with the technique of improving the optical property of an opening field, in the display which has the opening field in which electro-optics components, such as a liquid crystal cell and an organic electroluminescent element, were formed, and the non-opening field in which the thin film transistor which drives this electro-optics component was formed.
[0002]
[Description of the Prior Art] Drawing 16 is the typical fragmentary sectional view showing an example of the conventional active matrix liquid crystal display. On the substrate 1 which consists of glass etc., the metaled gate electrode 2 is formed so that it may illustrate. Gate dielectric film 3 is formed so that the gate electrode 2 may be covered. Amorphous semiconductor thin film 4A which moreover becomes the active layer of a thin film transistor is formed. Drain electrode 5D is formed in the end side of semi-conductor thin film 4A through amorphous semiconductor thin film 4A (n+) by which high impurity concentration was highly formed into low resistance. Source electrode 5S are formed in the other end side of amorphous semiconductor thin film 4A through amorphous semiconductor thin film 4A (n+) similarly formed into low resistance. The protective coat 8 is formed so that these drain electrode 5D and source electrode 5S may be covered. The pixel electrode 10 which moreover consists of transparence electric conduction film, such as ITO, is formed, and electrical connection is carried out to drain electrode 5D through the contact hole CON. The thin film transistor of illustration has the typical gestalt of the bottom gate structure which makes an active layer amorphous semiconductor thin film 4A,

such as an amorphous silicon. The thin film transistor which has the starting configuration is called the "reverse stagger channel dirty mold transistor."

[0003] Drawing 17 is the typical fragmentary sectional view showing other examples of the conventional display. A corresponding reference number is given to the conventional example shown in drawing 16 , and a corresponding part, and an understanding is made easy. In addition, also with the following drawings, a corresponding reference number is given to a corresponding part, and an understanding is made easy. Although the display device shown in drawing 17 is the same as that of the structure fundamentally shown in drawing 16 , it differs in that the channel protective coat 6 is formed in the upper part of amorphous semiconductor thin film 4A used as an active layer. This channel protective coat 6 has protected the part of the channel field of the active layer exactly located in right above [of the gate electrode 2]. This structure is called a "reverse stagger channel protection mold transistor."

[0004] Drawing 18 is the typical fragmentary sectional view showing another conventional example. The light-shielding film 11 is formed on the substrate 1, and amorphous semiconductor thin film 4A is formed through the substrate film 12 on it. The pixel electrode 10 is connected to the end of semi-conductor thin film 4A through amorphous semiconductor thin film 4A (n+) formed into low resistance, and, similarly source electrode 5S are connected to the other end through amorphous semiconductor thin film 4A (n+). Amorphous semiconductor thin film 4A used as an active layer is covered with a protective coat 6 and gate dielectric film 3, and the gate electrode 2 is formed on it. Amorphous semiconductor thin film 4A and the gate electrode 2 are reversed by the upper and lower sides, and are called the previous conventional example with an "order stagger transistor."

[0005] Drawing 19 is the advanced type of the conventional example shown in drawing 16 . The thin film transistor is covered with the flattening film 9, and the pixel electrode 10 is formed on it. This structure is "the high numerical aperture mold transistor which used the flattening film." In the above conventional example, a silicon nitride film or the silicon oxide film is used as gate dielectric film 3 or a protective coat 8 in many cases. Moreover, the flattening film 9 uses the organic resin film in many cases. The structure shown in drawing 16 - drawing 19 is explained to "a guide 27-PP 30 to liquid crystal display engineering (Nikkan Kogyo Shimbun 1998 issue)", "the '99 newest liquid crystal process technique (press journal 1998 issue) pp 21-27", and "flat-panel display 1999(Nikkei Business Publications 1998 issue) pp 118-131" at the detail.

[0006] The conventional example shown in drawing 20 uses polycrystal semi-conductor thin films, such as polish recon, to the device mentioned above using the amorphous semiconductor thin film as an active layer. The gate electrode 2 is formed on a glass substrate 1, and polycrystal semi-conductor thin film 4P are formed through gate dielectric film 3 on it. The part located in right above [of the gate electrode 2] serves as a channel field, and the both sides serve as the source field S where the impurity was poured into high concentration, and the drain field D. Semi-conductor thin film 4P are covered with the interlayer insulation film 7, and drain electrode 5D and source electrode 5S are formed on it. These electrodes 5D and 5S are covered with the protective coat 8. The gate electrode 2 is arranged on the lower part of an active layer, and the starting structure is called a "bottom gate mold transistor."

[0007] Drawing 21 shows the structure of a thin film transistor where the polycrystal semi-conductor thin film was similarly used for the active layer. Unlike the structure which showed this conventional example to drawing 20 , the gate electrode 2 is formed through gate dielectric film 3 on polycrystal semi-conductor thin film 4P. The starting configuration is called a "top gate mold transistor."

[0008] Drawing 22 expresses the CMOS structure which combined the N channel thin film transistor (N channel TFT) and P channel thin film transistor (P channel TFT) of bottom gate structure. The P channel thin film transistor uses for the active layer the polycrystal semi-conductor thin film 4 which poured boron into the source field S and the drain field D. The N channel thin film transistor uses for the active layer the polycrystal semi-conductor thin film 4 which poured phosphorus etc. into the source field S and the drain field D. The N channel thin film transistor is used for the drive of the pixel electrode 10 in this example. In order to control leakage current by this relation, the field where the impurity was poured in by low concentration between the drain field D, and the source field S and a central channel field is prepared, and it is good also as the so-called LDD structure.

The thin film transistor which makes an active layer these polycrystal semi-conductor thin films is stated to the detail at "the '99 newest liquid crystal process techniques (press journal 1998 issue) 53-pp 59" and "flat-panel display 1999(Nikkei Business Publications 1998 issue) pp 132-139." A silicon nitride film and the silicon oxide film are used for the gate dielectric film with which a thin film transistor is constituted in any case, an interlayer insulation film, and a protective coat in many cases.

[0009]

[Problem(s) to be Solved by the Invention] On the conventional active matrix liquid crystal display, one pixel has the opening field containing the pixel electrode 10 formed by the transparence electric conduction film, and the non-opening field in which the thin film transistor which drives a pixel electrode was formed. A non-opening field has film configurations, such as gate dielectric film which includes a thin film transistor, an interlayer insulation film, and a protective coat. This film configuration has extended as it is also to the opening field, and intervenes between the pixel electrode 10 and a glass substrate 1. A silicon nitride film, the silicon oxide film, the organic resin film, etc. will be contained in this film configuration. The refractive index of a glass substrate, the silicon oxide film, and the organic resin film is 1.4 to about 1.6 to the refractive indexes of a silicon nitride film being 1.8-2.0. Therefore, a configuration of multilayer structure of these film with which refractive indexes differ generates optical cross protection in an interface.

[0010] Drawing 23 expresses the transparency spectrum of the membrane which formed the multilayer structure of a silicon nitride film or the silicon oxide film in the glass substrate. It is the optical spectrum of the light field at the time of carrying out the laminating of a silicon nitride film (50nm), the silicon oxide film (200nm), a silicon nitride film (200nm), the organic resin film (2 micrometers), and the ITO (50nm) to order from the bottom on a glass substrate. While the interference phenomenon decided by the refractive-index difference and thickness between layers has appeared and dispersion arises in wavelength distribution of the transmitted light so that clearly from this transparency spectrum, loss arises also in the whole amount of transmitted lights. Since an interference pattern changes with dispersion in thickness, the technical problem that dispersion in a color arises for each display device of every occurs.

[0011]

[Means for Solving the Problem] The following means were provided in order to solve the technical problem of a Prior art mentioned above. The display concerning this invention has the pixel arranged in the shape of a matrix on the transparent substrate. Namely, each pixel It has the opening field in which the electro-optics component which carries out outgoing radiation of the light through this substrate was formed, and the non-opening field in which the thin film transistor which drives this electro-optics component was formed. Said non-opening field It has the first film configuration which includes this thin film transistor. Said opening field It has the second film configuration which extends from the film configuration of this first, and intervenes between this electro-optics component and this substrate, and said second film configuration is characterized by changing from the film configuration of this first in order to adjust the light passing through this opening field. In this case, said second film configuration contains 1 or two or more film, and in order to adjust the permeability or color temperature passing through this opening field of light, at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption is characterized by differing from the film configuration of this first. Moreover, said second film configuration is characterized by changing from the film configuration of this first so that the refractive index may approach the refractive index of this substrate compared with the film configuration of this first. Moreover, said substrate consists of glass and said second film configuration is characterized by removing the film of this silicon nitride including the film of the silicon nitride with which said first film configurations differ in glass and a refractive index. Moreover, said first film configuration contains the protective coat which covers the gate dielectric film which intervenes between the active layer of this thin film transistor, and a gate electrode at least, the interlayer insulation film which intervenes between this thin film transistor and its wiring, and this thin film transistor, and said second film configuration is characterized by removing at least one of this gate dielectric film, an interlayer insulation film, and protective coats. In this case, it is characterized by removing this gate dielectric film or an interlayer insulation film from said second film configuration in the process which forms the

contact hole to this gate electrode or this wiring. In one mode, said thin film transistor has the bottom gate structure which piled up the active layer through gate dielectric film on the gate electrode, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration. In other modes, said thin film transistor has the top gate structure which piled up the gate electrode through gate dielectric film on the active layer, and formed wiring through the interlayer insulation film on the active layer, and is characterized by removing gate dielectric film or an interlayer insulation film at least from said second film configuration. in addition, it is alike and said active layer is characterized by consisting of polycrystalline silicon. Furthermore, said protective coat consists of transparent organic resin film, and it is characterized by said second film configuration containing this organic resin film as it is.

[0012] According to this invention, the multilayer membrane structure formed in the non-opening field is not installed to an opening field as it is, but change is given for the membranous physical configuration in the non-opening field and the opening field. That is, the second film configuration by which it is placed between opening fields has attached change from the first film configuration in a non-opening field in order to adjust the light which passes along a pixel electrode. For example, about the layer from which especially a refractive index differs greatly from a glass substrate among two or more transparent membranes contained in the first film configuration, it is possible by removing this from the second film configuration to suppress the unnecessary reflection by multiplex interference and to improve the permeability and color temperature of an opening field.

[0013]

[Embodiment of the Invention] With reference to a drawing, the gestalt of operation of this invention is explained to a detail below. Drawing 1 is an example of the typical fragmentary sectional view showing the first operation gestalt of the display concerning this invention, and expresses 1 pixel. This display has the pixel arranged in the shape of a matrix on the transparent substrate 1 which consists of glass etc. One pixel is divided into an opening field and a non-opening field. The electro-optics component which carries out outgoing radiation of the light through a substrate 1 is formed in the opening field. With this operation gestalt, this electro-optics component consists of liquid crystal 17 held among the transparent electrodes 10 and 19 which counter mutually, and is called the so-called liquid crystal cell. This liquid crystal cell functions as a light valve which carries out outgoing radiation of the light which carried out incidence from the back light (not shown) arranged on the rear-face side of a glass substrate 1 to a front-face side. In addition, one electrode 10 is formed in a glass substrate 1 side as a pixel electrode, and the electrode 19 of another side is formed in the opposite substrate 20 side as a counterelectrode. The front face of the pixel electrode 10 is covered with the orientation film 16, and the front face of a counterelectrode 19 is also covered with the orientation film 18.

[0014] On the other hand, the thin film transistor TFT which drives the liquid crystal cell which mentioned the non-opening field above is formed. This thin film transistor has bottom gate structure, and polycrystal semi-conductor thin film 4P which consist of polish recon etc. are formed through gate-dielectric-film 3O which consists of silicon oxide etc. on the gate electrode 2 which consists of a metal so that it may illustrate. These polycrystal semi-conductor thin film 4P are covered with 7 Ns of interlayer insulation films which consist of silicon nitride, and source electrode 5S and drain electrode 5D are formed on it. These electrodes 5S and 5D are covered with the flattening film 9 which consists of organic transparence resin film. This flattening film 9 is also a protective coat to a thin film transistor TFT while carrying out flattening of the front face of a glass substrate 1. On the flattening film 9, the pixel electrode 10 is formed at the appearance mentioned above, and electrical connection is carried out to the thin film transistor TFT through drain electrode 5D. Gate-dielectric-film 3O stated above, 7 Ns of interlayer insulation films, the flattening film 9, etc. lap, and the first film configuration is formed. This first film configuration includes the thin film transistor TFT in a non-opening field. A paraphrase forms the first film configuration in the form where a thin film transistor is wrapped in from the upper and lower sides. On the other hand, the second film configuration which extended from the first film configuration is allotted to the opening field contiguous to a non-opening field. With the operation gestalt of illustration, the second film configuration consists only of flattening film 9, and intervenes between the liquid crystal cells and glass

substrates 1 which were formed on the pixel electrode 10.

[0015] As a description matter of this invention, the second film configuration is changing from the first film configuration in order to adjust the light passing through an opening field. The second film configuration contains 1 or two or more film, and in order to adjust the permeability or color temperature passing through an opening field of light, specifically, at least one of the number of membranous, thickness, a refractive index, and the rates of light absorption differs from the first film configuration. With this operation gestalt, the second film configuration is changing from the first film configuration so that the refractive index may approach the refractive index of a glass substrate 1 compared with the first film configuration. Specifically, as for a substrate 1, a refractive index contains the film (refractive indexes 1.8–1.9) of the silicon nitride with which glass differs from a refractive index by consisting of glass of 1.5, as for the first film configuration. On the other hand, as for the second film configuration in an opening field side, the film of silicon nitride is removed. With this operation gestalt, the first film configuration by the side of a non-opening field contains the flattening film (protective coat) 9 which covers 7Ns of interlayer insulation films and the thin film transistor TFT which intervene between gate-dielectric-film 3O which intervenes between polycrystal semi-conductor thin film 4P and the gate electrodes 2 which serve as an active layer of a thin film transistor TFT at least, a thin film transistor TFT, and its wiring electrodes 5S and 5D. In this case, as for the second film configuration located in an opening field side, at least one of gate-dielectric-film 3O, 7Ns of interlayer insulation films, and protective coats 9 is removed. Especially with this operation gestalt, 7 Ns of interlayer insulation films which consist of silicon nitride are removed from the second film configuration. It doubles and gate-dielectric-film 3O which consists of silicon oxide is also removed. Therefore, only the flattening film 9 which consists of transparence resin film remains in an opening field. These gate-dielectric-film 3O and 7 Ns of interlayer insulation films are the processes which form the contact to the gate electrode 2 or the wiring electrodes 5S and 5D, and are removed from the second film configuration. Therefore, it can respond only by modification of a mask pattern and an exposure development and etching processing can be advanced in common in a non-opening field and an opening field. In this example, it has the bottom gate structure which the thin film transistor TFT piled up polycrystal semi-conductor thin film 4P which become an active layer through gate-dielectric-film 3O on the gate electrode 2, and formed the wiring electrodes 5S and 5D through 7 Ns of interlayer insulation films on the active layer, and gate-dielectric-film 3O or 7 Ns of interlayer insulation films are removed from the second film configuration in an opening field at least. Thus, this operation gestalt uses polycrystal semi-conductor thin film 4P which consist of polycrystalline silicon as an active layer. Moreover, the flattening film 9 (protective coat) consists of transparent organic resin film, and the second film configuration contains this organic resin film as it is. In addition, depending on the case, the flattening film 9 can use inorganic glass membrane instead of the organic resin film. For example, TEOS can be formed by CVD and it can be processed into the flattening film 9. Moreover, polycrystal semi-conductor thin film 4P can be formed at low temperature 600 degrees C or less by using laser annealing. The elevated-temperature polish recon formed above 1000 degrees C with solid phase growth etc. depending on the case may be used.

[0016] With the first operation gestalt, to the appearance explained above, the unnecessary film is removed from an opening field, and only the flattening film 9 of direct organic resin is formed on a glass substrate 1 at it. When acrylic resin is used, the refractive indexes of the flattening film 9 are 1.4–1.6, and do not almost have a difference with the transparent glass substrate 1. The unnecessary reflection by the refractive-index difference stops therefore, occurring in this interface. Thus, by removing the layer from which a refractive index differs from an opening field as much as possible, multiplex interference decreases and panel permeability improves. Moreover, since cross protection is lost, color dispersion on manufacture can decrease between solid-states. Moreover, reflection of a panel can be lessened. Since a non-opening field and an opening field can be processed in a common process in that case, the process on new manufacture is not needed. When using low-temperature polish recon as an active layer especially, in order [which uses the silicon oxide film as gate dielectric film] to use a silicon nitride film for the pollution-control film and a passivation membrane from glass on the other hand, in almost all thin film transistor structure, it is easy to produce the laminated structure from which a refractive index differs. In that case, this invention has big effectiveness.

[0017] Drawing 2 is a graph showing the transparency spectrum in the opening field of the operation gestalt shown in drawing 1 . Among the graph, Curve A shows this operation gestalt and Curve B expresses the transmitted light spectrum of the conventional example. The second film configuration of the conventional example is the same as the first film configuration, and it contains all, such as gate dielectric film and an interlayer insulation film. By removing the unnecessary film from an opening field, while an interference phenomenon is lost and the spectrum has become Taira and others in the full-visible wavelength region, overall permeability was also compared with the conventional example and is improved 10%, so that clearly from a graph. That is, unnecessary reflection has also decreased.

[0018] Drawing 3 is an example of the typical fragmentary sectional view showing the second operation gestalt of the display concerning this invention. A corresponding reference number is given to the first operation gestalt shown in drawing 1 , and a corresponding part, and an understanding is made easy. With this operation gestalt, 3 Ns of gate dielectric film consist of silicon nitride, and interlayer insulation film 7O consists of silicon oxide. While interlayer insulation film 7O is removed from the opening field, 3 Ns of gate dielectric film are left behind as it is. By the transparency spectrum shown in drawing 2 , the spectrum by the side of short wavelength (blue) is falling a little. This operation gestalt has left silicon nitride intentionally to the opening field, in order to raise decline in the permeability by the side of this short wavelength. What is necessary is just to set the thickness as about 140nm, in order to raise short wavelength side blue using the multiple echo of silicon nitride. That is, 3 Ns of gate dielectric film of bottom gate structure can be beforehand formed by the thickness of 140nm, and a transparency spectrum can be lifted by the short wavelength side by leaving this film to an opening field as it is.

[0019] Drawing 4 is an example of the typical fragmentary sectional view showing the third operation gestalt of the display concerning this invention. In this example, the bottom gate structure where amorphous semiconductor thin film 4A which consists of an amorphous silicon etc. as a thin film transistor was used for the active layer is adopted. The TFT structure of a channel dirty mold is adopted especially in this example. However, it is not necessarily restricted to this method and can apply also to a channel protection mold. In addition, with this operation gestalt, 3Ns of gate dielectric film and 7 Ns of interlayer insulation films are removed from the opening field, and the pixel electrode 10 touches the glass substrate 1 directly. The TFT structure shown in drawing 4 is the same as the TFT structure fundamentally shown in drawing 16 .

[0020] Drawing 5 is an example of the typical fragmentary sectional view showing the fourth operation gestalt of the display concerning this invention. Fundamentally, it is the same as that of the third operation gestalt shown in drawing 4 . A different point is a point of being placed between opening fields by the flattening film 9 which consists of organic resin film.

[0021] Drawing 6 is the typical fragmentary sectional view showing the fifth operation gestalt of the display concerning this invention. The thin film transistor is the same as that of the TFT structure which has top gate structure and was fundamentally shown in drawing 21 . While the 72 Ns of the second interlayer insulation film which similarly consists of silicon nitride are removed from an opening field gate-dielectric-film 3O which consists of silicon oxide, and 71 Ns of insulator layers between the first passes which consist of silicon nitride, the flattening film 9 which consists of transparence resin is left behind as it is. Since the film with which refractive indexes differ greatly in a glass substrate 1 in the opening field which controls the transmitted light also by this operation gestalt substantially is removed, the effect of multiplex interference becomes small.

[0022] By the way, the polish recon and the amorphous silicon which are used as an active layer can penetrate a great portion of light, although it is coloring thinly. Controlling the optical property of an opening field, using this coloring positively is also considered. In this case, the semi-conductor thin film used for an opening field as an active layer will be left. The transparency spectrum of the polish recon film and the amorphous silicon film is shown in drawing 7 for reference. All of thickness are 40nm. The spectrum of polish recon is expressed with 4P, and the spectrum of an amorphous silicon is expressed with 4A. Since all have absorption by the short wavelength side, it becomes the hue which wore the yellow taste on the whole.

[0023] Next, with reference to drawing 8 and drawing 9 , an example of the manufacture approach of the display concerning this invention is explained concretely. This example carries out accumulation formation of the thin film

transistor of the bottom gate structure where polish recon was used for the active layer. First, on the glass substrate 1 transparent at (a), metals, such as Cr, aluminum, Mo, and Ta, are used and the gate electrode 2 is formed by the thickness of 200nm. It progresses to a process (b), and after carrying out 150nm laminating of 50nm and the silicon oxide film and using a silicon nitride film as gate dielectric film 3N and 3O on the gate electrode 2, respectively, 50nm of amorphous silicons is formed by continuation. Then, using means using an infrared lamp, such as heat annealing and laser annealing, an amorphous silicon is crystallized and semi-conductor thin film 4P which consist of polycrystalline silicon are formed. Or the direct polish recon film may be formed using other heat CVD methods etc. It progresses to a process (c) and the silicon oxide film is formed, patterning is carried out so that the channel section of semi-conductor thin film 4P on the gate electrode 2 may be covered after that, and it considers as the channel protective coat 6. The ion implantation of phosphorus or the arsenic is carried out by low concentration by using this channel protective coat 6 as a mask, and a LDD field is formed. In this case, it is not necessary to necessarily form the channel protective coat 6 for masks with silicon oxide, and a resist etc. may be used. In order to progress to a process (d) and to form the source field S and the drain field D, Mask M is formed by a resist etc. and the ion implantation of high-concentration phosphorus or arsenic etc. is carried out. Then, in order to activate the impurity poured in suitably, heat annealing and laser annealing are performed. It progresses to a process (e), and except for the part which forms a thin film transistor component, patterning of semi-conductor thin film 4P is carried out, continuation formation of 300nm of silicon nitride films and the 200nm of the silicon oxide film is carried out after that, and it considers as interlayer insulation films 7N and 7O, respectively.

[0024] It progresses to the process (f) of drawing 9 , and etching removal of interlayer insulation films 7N and 7O and the gate dielectric film 3N and 3O is carried out in the part of the contact hole CON on polycrystal semi-conductor thin film 4P, the part of the contact hole on the gate electrode 2 (not shown), and the part used as an opening field. It progresses to a process (g) and source electrode 5S and drain electrode 5D are formed with aluminum etc. Then, the flattening film 9 which consists of organic resin is formed in the field except a part, a pad formation part (not shown), etc. used as a contact hole CON. Finally it progresses to a process (h) and the pixel electrode 10 which becomes the wrap from ITO etc. about the opening field embedded by the organic flattening film 9 is formed. Then, in order to carry out orientation of the liquid crystal, the orientation film 16 is formed, and orientation processing is performed.

[0025] Let the substrate created by the above approaches be a panel by pouring in liquid crystal among both substrates the opposite substrate in which a color filter, a counterelectrode, and the orientation film were formed, lamination, and after that. By this approach, in order to remove the silicon nitride film with which the refractive indexes which exist in an opening field differ, a special process is unnecessary and is processed to coincidence using the process which takes contact to a gate electrode or a semi-conductor thin film. However, this invention may use a mask process different from a non-opening field, in order not to be restricted to this and to control the amount of etching of the cascade screen in an opening field. Moreover, although etching removal of all the layers of an interlayer insulation film and gate dielectric film is carried out by this approach, it cannot be overemphasized that it is not necessary to necessarily remove gate dielectric film for example, when only the silicon oxide film is being used for gate dielectric film. Moreover, since interference of the short period shown in drawing 23 has taken place with the silicon nitride film used as an interlayer insulation film, it is also possible for removing only this layer to make interference small.

[0026] Drawing 10 and drawing 11 are process drawings showing other examples of the manufacture approach of the display concerning this invention. Since it is the same as that of the previous manufacture approach shown in drawing 8 and drawing 9 fundamentally, only a point different especially here is explained. At a process (b), only 3 Ns of gate dielectric film of the monolayer which consists of silicon nitride are formed first. This thickness is about 140nm. Moreover, at a process (e), 200nm of silicon oxide is deposited previously, it is referred to as interlayer insulation film 7O, 300nm of silicon nitride is deposited on it, and it considers as 7 Ns of interlayer insulation films. After this, at a process (f), while leaving 3 Ns of gate dielectric film with which thickness becomes an opening field from the silicon nitride which is 140nm, interlayer insulation films 7O and 7N are removed. Under

the present circumstances, interlayer insulation film 7O which consists of silicon oxide is made to intervene between 7 Ns of interlayer insulation films which consist of silicon nitride as well as 3 Ns of gate dielectric film which consists of silicon nitride. Namely, will be touched by interlayer insulation film 7O which consists of 3 Ns of gate dielectric film which consists of silicon nitride, and silicon oxide. It is possible to leave only 3 Ns of gate dielectric film which becomes an opening field from silicon nitride using the difference of both etching rate. Then, an opening field and a non-opening field are covered with the flattening film 9 of transparent organic resin like a previous example. It is possible to raise intentionally the short wavelength side blue field of a transparency spectrum by leaving a silicon nitride with a thickness of 140nm to an opening field by this example.

[0027] Drawing 12 and drawing 13 are process drawings showing another example of the manufacture approach of the display concerning this invention. TFT of top gate structure is formed in this example. After carrying out 300nm laminating of 100nm and the silicon oxide film and using a silicon nitride film as the substrate film 12N and 12O on the transparent glass substrate 1 at a process (a) first, respectively, 50nm of amorphous silicons is formed by continuation. Then, it crystallizes using means using an infrared lamp, such as heat annealing and laser annealing, and is referred to as semi-conductor thin film 4P which consist of polish recon. Moreover, direct polycrystal semi-conductor thin film 4P may be formed using other heat CVD methods etc. Then, according to the configuration of the component field of a thin film transistor, patterning of polycrystal semi-conductor thin film 4P is carried out. It progresses to a process (b), 150nm laminating for example, of the silicon oxide film is carried out as gate-dielectric-film 3O on semi-conductor thin film 4P, and 300nm laminating of a tungsten, molybdenum, aluminum, etc. is carried out as a gate electrode 2 after that. Patterning is carried out to the configuration predetermined after that. It progresses to a process (c), and in order to form a LDD field by using the gate electrode 2 as a mask, the ion implantation of phosphorus or the arsenic is comparatively carried out by low concentration. In order to progress to a process (d) and to form the source field S and the drain field D, Mask M is formed by a resist etc. and high-concentration phosphorus or arsenic etc. is poured in. Then, in order to activate the impurity poured in suitably, heat annealing and laser annealing are performed. It progresses to a process (e) and 400nm of silicon nitride films is formed as 7Ns of interlayer insulation films. In this case, even if an interlayer insulation film uses the silicon oxide film, it is good also as a laminated structure of a silicon nitride film and the silicon oxide film.

[0028] It progresses to the process (f) of drawing 13 , and etching removal of the substrate film 12N and 12O, gate-dielectric-film 3O, and the 7 Ns of the interlayer insulation films is carried out in the contact hole CON formation part on polycrystal semi-conductor thin film 4P, the contact hole formation part on the gate electrode 2 (not shown), and the part of an opening field. It progresses to a process (g) and the flattening film 9 which consists of organic resin is formed in all the fields except a part, a pad formation part (not shown), etc. which form the contact hole CON with a pixel electrode. It progresses to a process (h) and the pixel electrode 10 which becomes the wrap from ITO etc. about the opening field embedded by the flattening film 9 is formed. Then, in order to carry out orientation of the liquid crystal, the orientation film 16 is formed, and orientation processing is performed. Thus, a liquid crystal panel completes the created TFT substrate 1 by pouring in liquid crystal among both substrates the opposite glass substrate in which a color filter, a counterelectrode, and the orientation film were formed, lamination, and after that.

[0029] Drawing 14 is the typical perspective view showing the whole indicating-equipment configuration concerning this invention, and expresses the example of an active matrix liquid crystal indicating equipment. This display has structure holding the electrooptic material which consists of liquid crystal 17 etc. between the drive substrate 1 and the opposite substrate 20. Accumulation formation of the pixel array section and the circumference circuit section is carried out at the drive substrate 1. The circumference circuit section is divided into the vertical-scanning circuit 41 and the horizontal scanning circuit 42. Moreover, the terminal electrode 47 for external connection is also formed in the upper limit side of the drive substrate 1. Each terminal electrode 47 is connected to the vertical-scanning circuit 41 and the horizontal scanning circuit 42 through wiring 48. The gate wiring 43 and signal wiring 44 which cross mutually are formed in the pixel array section. It connected with the vertical-scanning circuit 41, and the gate wiring 43 has connected signal wiring 44 to the horizontal scanning

circuit 42. The pixel electrode 10 and thin film transistor FTF which drives this are formed in the intersection of both wiring 43 and 44. On the other hand, the counterelectrode is formed although not illustrated to the internal surface of the opposite substrate 20.

[0030] Drawing 15 is the typical fragmentary sectional view showing another operation gestalt of the display concerning this invention, and expresses only 1 pixel. This operation gestalt is replaced with a liquid crystal cell as an electro-optics component, and organic electroluminescent element OLED is used for it. OLED piles up in order the anode plate A which consists of transparence electric conduction film, such as ITO, etc., the organic layer 110, and the metaled cathode K. It has dissociated for every pixel and the anode plate A is fundamentally transparent. Common connection of the cathode K is made between pixels, and it is light reflex nature fundamentally. If the electrical potential difference (about 10V) of the forward direction is impressed between anode plate A / cathode K of OLED which has the starting configuration, impregnation of carriers, such as an electron and an electron hole, will take place, and luminescence will be observed. Actuation of OLED is considered to be luminescence by the exciton formed with the electron poured in from an impregnation **** electron hole and Cathode K from the anode plate A. OLED carries out outgoing radiation of the light emitted itself to a rear-face side from the front-face side of the substrate 1 which consists of glass etc.

[0031] On the other hand, the thin film transistor which drives OLED consists of the gate electrode 2, gate-dielectric-film 3O piled up on it, and a semi-conductor thin film 4 piled up above the gate electrode 2 through this gate-dielectric-film 3O. This semi-conductor thin film 4 consists of a silicon thin film crystallized by for example, laser annealing. The thin film transistor is equipped with the source field S, the channel field Ch, and the drain field D used as the path of the current supplied to OLED. The channel field Ch is exactly located in right above [of the gate electrode 2]. The thin film transistor which has this bottom gate structure is covered with the 71 Ns of the first interlayer insulation film which consists of silicon nitride, and Electrodes 5S and 5D are formed on it. On these, OLED mentioned above through second interlayer insulation film 72O which consists of silicon oxide is formed. Electrical connection of the anode plate A of this OLED is carried out to the thin film transistor through electrode 5D. With this operation gestalt, from the opening field where OLED is allotted, while 71 Ns of interlayer insulation films of silicon nitride are removed, gate-dielectric-film 3O and second interlayer insulation film 72O which similarly consists of silicon oxide which consists of silicon oxide are left behind as it is.

[0032]

[Effect of the Invention] As explained above, in order to remove the layer from which a transparence substrate and a refractive index differ from an opening field as much as possible according to this invention, multiplex interference decreases and the permeability of a panel improves. Since multiplex interference can be controlled, color dispersion on manufacture can be decreased. Moreover, unnecessary reflection of a panel can be made small. When removing the layer from which a refractive index differs from an opening field, the process on new manufacture is not needed. In order to use a silicon nitride film for the substrate film and passivation membrane (protective coat) which prevent the contamination from glass while using the silicon oxide film for gate dielectric film when forming TFT which makes low-temperature polish recon an active layer especially, it is easy to produce the laminated structure from which a refractive index differs. In that case, removing a silicon nitride film from an opening field alternatively according to this invention has remarkable effectiveness, when making permeability high and preventing coloring.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the fragmentary sectional view showing the first operation gestalt of the display concerning this invention.
[Drawing 2] It is the graph which shows the transparency spectrum in an opening field.
[Drawing 3] It is the typical fragmentary sectional view showing the second operation gestalt.
[Drawing 4] It is the fragmentary sectional view showing the third operation gestalt.
[Drawing 5] It is the fragmentary sectional view showing the fourth operation gestalt.
[Drawing 6] It is the fragmentary sectional view showing the fifth operation gestalt.
[Drawing 7] It is the graph which shows the transparency spectrum of a semi-conductor thin film.
[Drawing 8] It is process drawing showing the manufacture approach of the display concerning this invention.
[Drawing 9] It is process drawing showing the manufacture approach of the display concerning this invention.
[Drawing 10] It is process drawing showing the manufacture approach of the display concerning this invention.
[Drawing 11] It is process drawing showing the manufacture approach of the display concerning this invention.
[Drawing 12] It is process drawing showing the manufacture approach of the display concerning this invention.
[Drawing 13] It is process drawing showing the manufacture approach of the display concerning this invention.
[Drawing 14] It is the perspective view showing the whole active matrix liquid crystal display configuration concerning this invention.
[Drawing 15] It is the fragmentary sectional view showing an example of the organic electroluminescence display concerning this invention.
[Drawing 16] It is the sectional view showing the conventional display.
[Drawing 17] It is the sectional view showing the conventional display.
[Drawing 18] Similarly it is the sectional view of the conventional example.
[Drawing 19] It is the sectional view of the conventional example.
[Drawing 20] It is the sectional view of the conventional example.
[Drawing 21] It is the sectional view of the conventional example.
[Drawing 22] It is the sectional view of the conventional example.
[Drawing 23] It is the graph which shows the transparency spectrum of the conventional display.
[Description of Notations]
1 [... A semi-conductor thin film, 7 / ... An interlayer insulation film, 8 / ... A protective coat, 9 / ... The flattening film, 10 / ... Pixel electrode] ... A glass substrate, 2 ... A gate electrode, 3 ... Gate dielectric film, 4

[Translation done.]